

**Manitoba
Natural Resources**



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prepared by the
Resource Allocation Working Group

**PLANNING REPORT
ON NATURAL
RESOURCES**

**MORTON-BOISSEVAIN
PLANNING DISTRICT**

Technical Report 84-4

Preface

Municipal Councils or established Planning District Boards are charged with the responsibility for municipal land use planning and development. This document has been prepared in response to a request from the local municipal planning authority for background material on the subject of natural resources for which the Department is responsible.

This document describes the natural resources in the study area, and identifies Provincial and Departmental concerns and objectives from a land use, development planning perspective. It offers for review, policies and guidelines to remedy, mitigate or anticipate issues and land use problems.

The bases for this report are the Provincial Land Use Policies dealing with natural resources and the policies of the Department of Natural Resources.

Municipal planning is a consultative process, and the information and policies discussed in this document are offered as advice to the local authority in their land planning deliberations.

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FISHERIES RESOURCES

I. PRESENT CONDITIONS/INTRODUCTION

Boissevain Reservoir

The Boissevain Reservoir was constructed by P.F.R.A. in 1955. It was turned over to the R.M. of Morton and the Town of Boissevain in 1963 and presently serves as the water supply for the Town of Boissevain and a local recreation area.

Boissevain Reservoir has a surface of approximately 36 hectares (90 acres), a maximum depth of 4.6 meters (15 feet) and a storage volume of 630 cubic decameters (510 acre feet). Most inflow is from the upper Pembina River watershed. Wind action is normally sufficient to mix the water from top to bottom and prevent summer stratification. The reservoir is one of the better fisheries waterbodies in the Planning District and has never suffered from significant fish kill.

From 1957 to 1966, the reservoir was stocked with trout and several master angler fish were reported. Fisheries Branch was petitioned to stock more catchable fish species (e.g., perch, pike and walleye) and beginning in 1967 this request was honored. Angling success has been erratic and recent test nets show the reservoir is dominated by suckers. Trout have not persisted while walleye and pike numbers appear to be low.

The impoverished angling species populations may relate, in part, to the degree and duration of outflows and the loss of these species down the overflow (drop inlet) structure during high discharge periods. In 1976, local reports indicated that pike had been seen passing into the drop inlet and in 1978, a pike was found stranded in the base of the drop inlet. Walleye fry stocking appears to be ineffectual as they are weak swimmers, tend to drift with the current and are normally stocked in the spring when high outflows still exist. Screening is not practical as fry are so small that they would pass through most screens. Very fine screens would quickly clog with algae and detritus. A coarse fence may be effective in reducing adult fish losses. Recent attempts to monitor the extent of this loss has not been successful. In the last three years spring flows have been minimal resulting in nil or low short term flow through the drop inlet structure and no loss of fish has occurred.

Even in high flow years, outflows have normally stopped by mid-summer. Fall stocking would not suffer the losses that could occur from spring stocking. Partially in consideration of this fact, walleye are being reared in shallow ponds and are captured and physically transferred to the reservoir as fingerlings, ranging from 3 to 6 inches in length. Since 1981, over 28,000 walleye fingerlings have been transferred to Boissevain Reservoir. Also, large numbers of forage minnows were moved to the reservoir when it was found that food items suitable for predatory species were in low supply. The extent of the angler harvest has never been accurately estimated for this reservoir.

The majority of the Boissevain Reservoir watershed lies in a highly agricultural area. For several years, livestock operations, land use, sedimentation and nutrient loading from eroding soils have impacted reservoir water quality.

Wind and water have carried fertilizing nutrients to reservoir waters, resulting in algae and weed growth proliferation. Excessive algae and weed growth contribute to color, odor and taste problems, increase water treatment costs and lower dissolved oxygen levels that could be critical to fish. The Turtle Mountain Conservation District should be applauded for their recent efforts to control and eliminate these nutrifying forces. Vegetative buffers, fencing, shoreline stabilization, nutrient diversion, protective by-laws and cooperative action with the agricultural community are examples of Conservation District activities directed toward water quality protection. However, due to internal nutrient cycling (due in part to a low flushing rate and nutrient rich bottom sediments) significant improvement in water quality cannot be expected.

William Lake

William Lake has a surface area of about 80 hectares (200 acres) and a maximum depth of about 7 meters (23 feet). It has no defined outlets or inlets and, as such, is a seepage lake that receives water from adjacent sources. Consequently, William Lake water levels fluctuate with prevailing drought and high water cycles.

This is one of the best sport fish waters in the Planning District. Occasionally summer fish kills occur in the lake but significant winterkill has not occurred in the last 24 years. From 1924 to 1954, William Lake was periodically stocked with walleyes. A few walleyes are still being caught indicating some natural reproduction of this species. From 1957 to the present, rainbow trout have been stocked almost every year. In 1979, brown trout were stocked for the first time. In 1983, one hundred brown trout of master angler size were reported from William Lake. This represents 90 percent of all master angler brown trout reported for the province that year.

A creel census conducted between April, 1981 and May, 1983, indicates a very low catch rate of about .06 trout per angler hour and a very high natural mortality rate (about 88%) for young trout. This high natural death rate is likely due to predation by birds and large fish. The stocking of older trout has been initiated to help reduce this high predation rate. The few trout that do survive each year are difficult to catch but grow quickly to trophy size. It was estimated that anglers spend over 20,000 hours per year fishing at William Lake.

The only significant development on William Lake is the campground consisting of 32 unserviced sites and other Parks Branch facilities.

George Lake

George Lake has a surface area of about 80 hectares (200 acres) and a maximum depth of about 4.2 meters (14 feet). As a seepage lake water levels fluctuate with precipitation cycles.

George Lake is eutrophic (nutrient-rich) and winterkills, on the average, about 40 percent of the winters. Algae and weed growth are problems relating to the winterkill. Bullrushes surround most of the lake for a distance of

about 8 meters (26 feet) from shore. In most areas where the water is 1.5 meters (5 feet) or less in depth, a variety of aquatic vegetation is visible at the surface by mid-summer.

George Lake was initially stocked with smallmouth bass in 1978. Winterkill occurred in 1979 and 1980. Adult pike and perch were stocked in 1982 but winterkill occurred again in 1984. Adult pike have been restocked but a substantial fishery cannot be expected without costly intensive management (e.g., artificial aeration and/or weed harvesting).

George Lake cottage subdivisions have been removed from the community pasture jurisdiction to be managed and developed for recreational purposes. Recent developments include road access, a boat launch and hydro installation. A number of the 37 available lakeshore lots have been developed. Conditions affecting cottage development include the use of sewage holding tanks or vault-type privies. This will help reduce development impacts on water quality.

Charlton Lake

Charlton Lake has a surface area of about 150 hectares (380 acres) and a maximum depth of about 4.5 meters (15 feet). Typically, this is a seepage lake and in most years, no outflow occurs from the outlet on the northeast shoreline.

The lake is eutrophic and winterkills, on the average, about 30 percent of the winters. Algae and weed growth are problems. By mid-summer, the east bay, a zone around the island and most shallow shoreline areas are covered with weeds.

In 1968, a survey by Canada Land Inventory reported the presence of suckers in Charlton Lake. This would indicate that, in some years, outflow must be substantial allowing fish passage from the Pembina River to Starke Creek and Charlton Lake.

Walleye fry were stocked in Charlton Lake in 1974, 1978 and 1979. Winterkill occurred in 1977, 1979 and 1980. Therefore, no sport fishery exists in the lake at the present time. Weed harvesting may help reduce the winterkill rate. Artificial aeration would be very costly as there is no hydro in the area.

In the fall of 1978 a trail was pushed through along the north shoreline to the lake outlet and a 20cm (8 inch) diameter round culvert was placed in the natural outlet channel about 0.3 meters (1 foot) above the natural channel grade. Lake levels were low and the intent of the culvert and dyke was to elevate lake levels by a small amount, and, hopefully, increase fish overwintering potential. Due to insufficient inflow, water levels did not rise until the spring of 1979. Higher water, however, did not prevent the winterkill in 1980.

Access has been somewhat of a problem; a community pasture surrounds the lake, gates are kept locked while cattle are present and an unmarked and unmaintained trail leads to the north shore. Except in winter, public use of the area was not encouraged although angler access was usually allowed through personal requests to the pasture manager.

Other Waters

Most other waters in the District are too shallow and winterkill too frequently to develop permanent fisheries. Katie Lake and Robert Lake may be exceptions; they are very shallow but are close to hydro so that continuous winter aeration may be feasible. Whitewater Lake is too shallow for fisheries use. A pond on the M.E. Buck property east of Boissevain has been used by the Fisheries Branch for the rearing of walleye fry to fingerling size. A small unnamed pond just east of William Lake has been used as a source of forage minnows that have been transferred to other sport fish waters in the area. A few farmers operate hobby trout ponds on private land.

A number of headwater streams arise in the District and are of value to fisheries. The Pembina River, Starke Creek, Little Pembina River and Elgin Creek, for example, support pike and sucker runs when flows and dams allow. Most of the adult spawners return to the adjoining reservoirs and lakes immediately after spawning but the tributaries serve as rearing areas for the newly hatched fry and fingerlings. Minnows, used as forage by other fish and birds, overwinter in deeper areas and beaver ponds.

Waters within Turtle Mountain Park have not been considered. It is assumed fisheries within the park will be administered in accordance with the Turtle Mountain Development Plan that is nearing completion.

II. CONCERNS/OBJECTIVES

Several tributary streams and the Boissevain Reservoir lie in an agricultural area which influences fisheries potential in the Planning District. The shallow nature of existing waterbodies, intermittent flows, erosion, nutrient loading and drainage have impacted some fish stocks. Any factors that adversely influence water quality or quantity can adversely influence fish populations. Since demand is high and fishing opportunities are few, existing fisheries and upstream watersheds should be protected from nutrient loading and contamination.

The Turtle Mountain Conservation District has shown an awareness to these problems and their corrective action to date is applauded.

Fish are a renewable resource and it is incumbent upon all governments to ensure the provision of a suitable habitat that will assure continuing fish stocks for the long term benefit of all Manitobans.

Specifically, the fisheries concerns/objectives are:

1. To ensure the survival or improvement of fish stocks, subject to the effects of natural environmental changes and approved man-made environmental changes. Fish habitat associated with Boissevain Reservoir, William Lake, George Lake, and Charlton Lake should be protected. Elgin Reservoir lies outside the Planning District but activities along Elgin Creek can impact this fishery. Similarly, activities and development along the Pembina River, Starke Creek and the Little Pembina River can influence downstream resources. These tributaries can support fish runs and serve as rearing areas for several fish species.

2. To maintain, enhance and diversify angling opportunities to Manitobans to meet existing and future demands.
3. To promote communication and cooperation between private landowners, industry, the public, local government and the Department of Natural Resources so as to achieve high standards of conservation practices.

III. POLICIES/GUIDELINES

Although fisheries habitats are being stressed and have been reduced, what remains can be retained and enhanced by judicious use of land and water in the Planning District. In order to achieve the fisheries objectives and to mitigate and alleviate concerns, the following apply:

1. Fisheries habitat; spawning sites and nursery areas should be protected.
 - a) Ditching and stream rechannelization should not be permitted in direct tributaries to the watershed capable of supporting spawning and nursery habitat. The construction of dykes as opposed to channel deepening and straightening shall be encouraged. Measures to limit nutrient and sediment inflow shall be encouraged.
 - b) Land clearing, cultivation and development to the edge of significant waterways shall be prohibited. Where possible a buffer strip of natural vegetation 91.5 meters (300 feet) wide from the ordinary high water mark shall be maintained along the watershed. Development or maintenance of appropriate vegetative cover along waterways to prevent erosion, siltation and reduce runoff shall be encouraged.
2. Shorelines subject to intensive use and development should be protected from excessive erosion and organic loading. Activities that discharge pollutants shall be restricted in their location and it may be required that precautionary safeguards that mitigate the pollutant be incorporated into the development activity.
3. The right of public access to fishing waters shall be maintained in accordance with such Acts, Regulations and contracts that are in place from time to time.

IV. IMPLEMENTATION

The objectives and policies with respect to fisheries shall be implemented as follows:

1. By assistance and advice on conservation practices by the staff of the Department of Natural Resources.
2. By public and private cooperation through management and development agreements.
3. By the Council through the judicious use of restrictive zoning by-laws, subdivision control procedures and the issuance of development permits.

FORESTRY RESOURCES

I. PRESENT CONDITIONS/INTRODUCTION

The Morton-Boissevain planning district is within the Aspen Parkland Section, Forest Management Unit 06 as defined in the Manitoba forest inventory classification system, 1980.

Turtle Mountain Provincial Forest is located in the District. It was first set aside for forestry purposes when 109 square miles were designated as a Timber Reserve by the Dominion government in 1895. Redesignation to a Forest Reserve occurred in 1906. Subsequently, the eastern third was converted to a Community Pasture. Turtle Mountain Provincial Park was established to cover 97 percent of the Forest, although management of the timber resource remains the responsibility of Forestry Branch. The rolling hills of the Forest are clad in deciduous forest, predominantly trembling aspen, interspersed with black poplar, ash, birch, Manitoba maple, elm and bur oak, mostly dating from wildfires which swept the area in the early part of this century. Climax forests which survived these fires occur on Arbor and Eagle islands in Max Lake. The forest resource suffers from under-harvesting, so that much of the aspen is mature and over-mature.

A forest inventory of the area will be completed in 1986. Both Crown land and private land forest inventory information will be available and should be of benefit to landowners in the area. Field forest measurements that may be required on private lands to complete the forest inventory will only be done with permission from the landowners.

As the area is in close proximity to population centres, landowners with forested land on their holdings might consider growing trees as a crop, for example fuel wood. This is particularly true for land unsuitable for other agricultural purposes but still capable of supporting tree growth.

While trees and forests have value as a renewable cash crop, their presence is valuable in other ways. These include control of precipitation run-off and retarding snow melt to lessen flood risk; erosion control both water and wind; a habitat for wildlife; and, recreation opportunities for people. Furthermore, forest harvesting operations can be done in a manner that will enhance all forest values; however, it is essential that fire be kept out.

While the Department, and, specifically, the Forestry Branch, do not at present provide a forest extension service, regional forestry staff will be pleased to provide advice on forestry information to the extent that their other duties permit doing so.

Elm trees are susceptible to the Dutch Elm Disease. The Dutch Elm Disease Act was enacted to control the spread of the disease and regulations thereunder cover the removal of elms, portions of them, and subsequent disposal thereof.

OUTDOOR RECREATION

I. PRESENT CONDITIONS/INTRODUCTION

The Morton-Boissevain Planning District has a good capability (Map 1) for a wide variety of outdoor recreation opportunities. The highest potential is centred on the Turtle Mountain area and particularly on the Turtle Mountain Provincial Park and International Peace Gardens (Map 2). This upland area provides an interesting topography and cultural pattern which provides good opportunities for land-oriented outdoor recreation activities - e.g., trail activities, hunting, travelling, and viewing. Lakes within the Turtle Mountain area provide regionally important camping, cottaging, angling and boating capabilities, as well as adding to an interesting and high quality scenic environment.

The Turtle Mountain area must be considered to be an important provincial and regional outdoor recreation resource. Landscape characteristics which are unique to the region, add to the overall high quality of this area. Excellent recreation opportunities combined with ready access to major population centres and to local residents have resulted in a high level of development and use. The local environment is, however, sensitive to man's activities and must be carefully conserved in order to maintain, on a continuing basis, these high levels of use.

Much of the demand for the outdoor recreation opportunities offered in the Planning District comes from outside of the Planning District. While this can lead to potential problems and land use conflicts, there is a substantial return to the planning area through related support services. The District should, in planning for the future, consider the importance of resident and non-resident outdoor recreation use.

Natural Features and Recreation Facilities

International Peace Garden

The International Peace Garden (Map 2) was dedicated by the Federal Governments of Canada and the United States on July 14, 1932. The park commemorates over 150 years of peace that have existed between the United States and Canada. The Peace Garden symbolizes that two nations can live in harmony along the longest unfortified boundary in the world.

Turtle Mountain Provincial Park

The 73 square mile Turtle Mountain Provincial Park represents a natural upland deciduous forest area of Manitoba. The upland is also the only area of the province underlain by rock dating from the Cenozoic period, making it the youngest land in the province in geological terms. The forested, lake dotted upland exhibits natural and recreational resources of provincial and regional significance.

The Turtle Mountain Provincial Park Management Plan defines the park's precepts and states the park will:

1. Protect and maintain the vegetation and wildlife communities representative of the Turtle Mountain landscape region.
2. Provide a variety of recreational experiences suited to its wooded uplands and enhance, where possible, its regionally important water-based recreational opportunities.
3. Protect and preserve the rare examples of unaltered hardwood forest, orchids and animal species such as the western painted turtle which are native to the mountain, in order that these species can continue and be a part of the living heritage of Southwestern Manitoba.

Turtle Mountain is classified as a natural park. Natural Parks are capable of providing a wide range of outdoor recreational opportunities and are generally capable of accommodating commercial resource extraction/harvest activities.

The Turtle Mountain Provincial Park Management Plan defines the specific role the park will play within the Provincial Park System and outlines park development and conservation objectives for the duration of the plan.

Land use decisions will be based on a multiple use policy with respect to hunting, trapping, forestry and mineral exploration. Approximately 20 percent of the park will be zoned as backcountry for non-consumptive resource uses such as canoeing, camping and hiking.

William Lake Provincial Recreation Park

The 293 acre William Lake Provincial Recreation Park has a variety of recreation facilities for park users. Park opportunities for visitors include angling for rainbow trout, swimming, picnicking and camping.

Future development of the park will involve expansion of the campground, construction of walking trails and increasing public awareness of sport angling opportunities. The existing character of the park will not be altered as surveys indicate visitors enjoy the peacefulness and scenic qualities found at William Lake.

The existing Provincial Recreation Park is bounded by the PFRA Community Pasture which adequately buffers the park from incompatible land uses.

PFRA Community Pasture

The Community Pasture is currently experiencing recreational use in the form of a cottage subdivision at George Lake and a hiking trail and interpretive signing at the Turtle's Back.

Potential for recreational facility development was documented in the 1979 Conceptual Development Plan for the Turtle Mountain Community Pasture. Although

the land and water base of the Community Pasture has moderate to high capability for supporting recreation, the current public demand for additional facilities does not warrant development. Therefore, recommendations set forth in the 1979 Conceptual Development Plan will not be actioned until visitor use levels increase at Turtle Mountain Provincial Park and William Lake Provincial Recreation Park. When and if visitor use increases to a point where additional facilities are required, negotiations with PFRA representatives would determine what portions of the Community Pasture could be used for recreation.

Pembina River Valley

The Provincial Park System Plan identifies the Pembina River valley as a potential recreation trailway. The portion between Windygates on the Manitoba-U.S. border to Rock Lake has been initially proposed for designation. The remaining section of the Pembina River watershed could be incorporated into a trailway park if demand warranted. Future recreation opportunities associated with the Pembina River valley should be protected by ensuring that incompatible land uses adjacent to the river are minimized. Natural buffers along the river should be retained and encouraged.

Whitewater Lake

Whitewater Lake is intensively used by waterfowl hunters during the fall. Both Canadian and American hunters use the area, especially for goose hunting. The lake and shorelands should continue to be managed for waterfowl sport hunting due to its popularity with locals and tourists.

Fairburn Wayside

Fairburn Wayside located on PTH #3 provides rest stop facilities for motorists. The wayside has an information sign commemorating the site of the Fairburn School.

Cultural Features

A cultural features inventory for the study area is incomplete but known sites exhibiting cultural significance include:

1. International border - Boundary Commission Trail.
2. Dunseith trail.
3. Archaeological sites in the Turtle Mountain upland.
4. Boissevain sandstone quarry.

The historic importance of these sites should be interpreted to the public while ensuring site integrity is not jeopardized.

II. CONCERNS/OBJECTIVES

The future development of the Morton-Boissevain Planning District should consider the potential for outdoor recreation, maintenance or enhancement of environmental quality and prevention of land use conflicts with outdoor recreation uses. In this respect the physical and natural resources of the planning area

are most important and requires identification, maintenance and protection. All land uses within or adjacent to high capability outdoor recreation areas must be sensitive to and supportive of an outdoor recreation theme. If these valuable resources are disrupted or damaged by conflicting uses or developments, the recreation opportunities will be degraded, and very likely in a permanent fashion.

The following identifies specific objectives:

1. The integrity of the International Peace Gardens should be protected through zoning and buffer zones to ensure that the character of the area is retained.
2. Concerning Turtle Mountain Provincial Park, the Morton-Boissevain Development Plan can assist in retaining the atmosphere of a quality rural setting with diverse extensive-use recreational opportunities by ensuring that:
 - a) The areas immediately adjacent to (up to 3 miles from) Turtle Mountain Provincial Park not be considered for intensive development or development that would rely on Turtle Mountain Provincial Park for the provision of recreation opportunities.
 - b) Space standards and carrying capacity figures be used by district administrators to assess recreational proposals for the planning district and that the standards chosen for the district reflect the capability of the region to support recreational use.
3. The variety of natural, cultural and recreational features and facilities found in the plan area should be profiled by means of information and museum displays, interpretive programming, and school outdoor education programs. Sites with interpretive significance should be protected by means of buffers, or zoning by-laws.
4. All waterbodies within the Turtle Mountain area should be recognized, identified and safeguarded through resource use policies which give a priority to outdoor recreation.
5. Development in recreation areas should not exceed the carrying capacity of the resource.
6. Recreation lands must be afforded protection from adjacent areas which would diminish or endanger their use.
7. The benefits to the community from resource-oriented outdoor recreation must be maintained or improved.
8. Major road access corridors to outdoor recreation areas, including provincial park facilities should be identified and afforded protection from environmental and aesthetic degradation.
9. The right of public access to outdoor recreation opportunities must be ensured.

10. Recreation areas must be protected from unplanned residential development and other potentially conflicting uses.
11. Outdoor recreation-type development must occur in established areas, thereby helping the Municipalities to provide services in the most efficient manner.

III. POLICIES/GUIDELINES

1. All Class 3 recreation areas shall be defined and given proper recognition. Resource and land use policies shall give a priority to outdoor recreation
2. All Class 4 and 5 recreation capability upland areas are of regional and local significance and should be recognized as providing outdoor recreation opportunities for certain types of activities, e.g., cross-country skiing, recreational hunting, hiking, etc. While outdoor recreation may not always be considered the priority use, other uses must consider the potential effects on outdoor recreation interests.
3. Residential development may not be supportive of outdoor recreation activities and it may be desirable to separate these developments. Scattered or random residential development would generally be in conflict with outdoor recreation priorities.
4.
 - a) Within the Planning District, specific areas for future cottage or seasonal residential development shall be identified and promoted in order to reduce uncontrolled development, and to maintain the integrity of sensitive recreation areas.
 - b) Permanent residency within new or existing seasonal residential or cottage developments will not normally be allowed. Existing permanent residences should be identified as a non-conforming use.
5. Existing areas of public access shall be recognized and maintained, or improved.
6. The designation of development policies respecting lands adjacent to and along access roads to parks and recreation areas shall not endanger or degrade the quality of the recreation opportunity. Strip development along provincial roads and major municipal roads shall not be allowed.
7. The Planning District shall encourage the development and growth of outdoor recreation enterprises and service functions which are compatible with the character of the community and which provide a source of employment.
8. Agricultural land use practices and policies applying to areas within or in close proximity to important outdoor recreation areas shall not adversely affect the recreation opportunities.

IV. IMPLEMENTATION

The objectives and policies can be achieved by means of appropriate zoning by-laws, conditions of subdivision approval, development permits and building permits.

Consultation with staff of the Department of Natural Resources is encouraged.

WATER RESOURCES: GROUNDWATER

I. PRESENT CONDITIONS/INTRODUCTION

The availability of groundwater in the District varies over a wide range: in some parts of it groundwater is readily available and in some areas potable water aquifers do not exist (Figure 1).

In general, groundwater is fairly readily available on the slopes of Turtle Mountain. The slopes are underlain by an extensive sandstone aquifer (Map 3) that yields adequate supplies for domestic and normal farm requirements and at some location may be suitable for moderate industrial or municipal requirements. Groundwater quality in this area generally is fair to good.

In the Turtle Mountain upland area the most common aquifers are formed by lenses of sand and gravel interbedded in glacial till. In this area groundwater is not as readily available as on the slopes. Groundwater quality on the upland area is fair to good.

In the lowland area, which occupies most of the northern half of the District, fractured zones in the shale bedrock constitute the most common aquifers. However water in the shale often is salty or of very poor quality. Scattered water bearing lenses of sand and gravel occur above the shale bedrock but, in general, are not common.

Existing water well information indicates a buried bedrock valley in which sand and gravel aquifers are common extends northerly from Highway No. 3 through the central part of Townships 3 and 4, Range 21W.

Because most of the aquifers are covered by thick low permeability materials, only a few small groundwater pollution hazard areas exist in the District (Map 4).

II. CONCERNS/OBJECTIVES

The groundwater supply in the District varies considerably from place to place. In the southern half of the District the availability of groundwater is, in general, adequate for present requirements and for moderate new development. In the northern part of the District groundwater often is of very poor quality or salty and the availability of potable groundwater is very limited. Hence the overall concern is groundwater resource management and protection to assure adequate supplies for existing users and for potential development. In a few small areas in the central part of the District shallow aquifers that are subject to pollution exist. Consequently these areas are considered to be groundwater pollution hazard areas.

Objectives

1. To manage the aquifers in a manner that would not deprive existing users of their water supplies and would not be detrimental to the groundwater potential in the District.

2. To maintain groundwater withdrawal within acceptable limits.
3. To prevent aquifer pollution.

III. POLICIES/GUIDELINES

1. Intensive development (e.g., subdivisions) and high capacity wells should be permitted only in areas where they will not cause a reduction in water supply for existing users.
2. Groundwater consumption should not exceed the total sustained yield of an aquifer.
3. Wells should be installed in a manner that would not have a detrimental effect on aquifers.
4. Activities that may cause pollution under normal operating conditions or by accident should not be permitted in groundwater pollution hazard areas unless it can be proven by adequate field investigation that the proposed activities will not cause pollution of existing or potential groundwater supplies in the area.

IV. IMPLEMENTATION

1. Aquifer management is implemented by the Water Resources Branch of the Manitoba Department of Natural Resources under the provisions of the Ground Water and Water Well Act and the Water Rights Act.
2. Well construction in respect to prevention of detrimental effect on aquifers is regulated by the Water Resources Branch of Manitoba Department of Natural Resources under the provisions of the regulations made under the Groundwater and Water Well Act.
3. Aquifer pollution prevention is implemented by the Environmental Management Division of the Department of Environment and Workplace Safety and Health.

WATER RESOURCES: SURFACE WATER

I. PRESENT CONDITIONS/INTRODUCTION

The Morton-Boissevain Planning District is situated in the Turtle Mountain area of Southwestern Manitoba. The region south of Boissevain is located on the escarpment and the terrain slopes steeply to the north. An extensive network of small natural waterways drains this area, directing run-off to Whitewater Lake in the west and the Pembina River to the east.

The area north of Boissevain has much milder slopes and limited drainage. An array of sloughs or potholes is the predominant surface water characteristic of this region.

The surface water system is shown on Map 5. All waterways within the District are under the jurisdiction of the Turtle Mountain Conservation District. The Conservation District is responsible for the conservation and management of water and related resources.

II. CONCERNS/OBJECTIVES

Surface water concerns in the District are generally limited to drainage problems on the lands below the escarpment and water erosion on some of the steeply sloping escarpment areas. As most of the hazard areas are in agricultural use or in the natural state, damages have been minimal. However, should development or other unsuitable land uses occur in hazardous areas this may lead to acceleration of environmental damages, interference with natural processes, public expenditures for remedial works or assistance, waste of resources and personal loss and hardship. In this respect the following objectives are established:

1. To minimize personal hardship and inconvenience and adverse affects on public health and loss of life;
2. To minimize property damage and public expenditures for relief or protection in areas subject to flooding, water erosion, wind erosion, bank instability, landslide or subsidence;
3. To restrict activities which would accelerate or promote damages arising from causes such as erosion or bank instability;
4. To acquire access to all waterways in order to carry out public work projects when required;
5. To maintain the natural capacity of the streams to convey flood flows;
6. To encourage the preservation of natural vegetation along the banks of waterways.

III. POLICIES/GUIDELINES

1. The Board will support the policies and programs of the Conservation District regarding water and related resources within the Planning District.

2. Development in areas which, in the opinion of a Board or Council, may be subject to hazards such as flooding, erosion or bank instability shall generally be limited to agricultural uses or open space uses. Under special economic or social circumstances the Board or Council may permit more intensive development if the hazard is eliminated or protected against. Development in these hazardous areas shall be subject to the following requirements:
 - a) If the land is subject to flooding all permanent structures shall be located on land which has been raised by fill to an elevation at least 0.6 meters above the 100 year flood level.
 - b) Land which may be eroded away within a period of 50 years shall be excluded from development unless it is demonstrated, to the satisfaction of the Board or Council, that the erosion process has been halted.
 - c) Development shall not be permitted on lands subject to bank instability, landslides or subsidence.
 - d) All structures and services shall be protected against damage and shall be functional under hazard conditions.
3. Notwithstanding (1) development will not be permitted if, as a result of the development;
 - a) There is an added risk to life or safety, or
 - b) Water flow, flow velocities or stages are adversely altered, obstructed or increased.
4. Activities such as dumping, excavation, clearing, cultivation, or excessive grazing which would accelerate or promote dangerous erosion or bank instability will be prohibited.
5. In areas where the specific hazard has not been defined, permanent structures shall be set back from all waterways a distance of at least 10 times the height of the bank above channel grade or 60 meters whichever is greater unless an engineering investigation shows that these limits may be reduced.

IV. IMPLEMENTATION

The policies shall be implemented by means of, variously, zoning by-laws, conditions of subdivision approval, the issuance of development permits and building permits, development agreements and such programs as are determined from time to time by the Boards or Councils to be necessary and not in conflict with the provisions of any part of the Plan.

WILDLIFE RESOURCES

I. PRESENT CONDITIONS/INTRODUCTION

The Municipality of Morton is characterized by the most prominent relief feature in southwestern Manitoba - the Turtle Mountain which straddles the Canada-U.S. border. The Turtle Mountain upland, consisting of the Turtle Mountain and Mountainside Escarpment extends 40 miles along the border, largely in this municipality. Morainic hills with numerous depressions, shallow lakes and potholes occur on the top portion of the mountain. Largely forested, the Turtle Mountain proper is composed of the Turtle Mountain Provincial Park, Provincial Forest and the PFRA Community Pasture.

The Mountainside Escarpment occurs in the lower (north) slopes of the mountain and consists of terrain with smooth to gently rolling slopes cut by deep ravines. The area is essentially a grassland and grassland-forest-transition area. Much of it is cultivated or under pasture. These slopes grade into the adjacent Boissevain Plain at lower elevations.

The Whitewater Lake Basin is characterized by Whitewater Lake, a large shallow saline lake to the north of PTH #3 between Boissevain and Deloraine. Soils in the Basin are imperfectly and poorly drained due to high water tables. Most of the stream channels from the escarpment are ephemeral in nature as they approach Whitewater Lake, but flow primarily after spring thaw and heavy summer rains.

North of the escarpment and to the north and east of Whitewater Lake lies the Boissevain Plain, characterized by open, gently rolling landscape, largely under cultivation or pasture and periodically dotted with potholes and small bluffs.

In the Municipality, the Turtle Mountain, the escarpment and Whitewater Lake area are by far the most valuable areas for wildlife, particularly deer and waterfowl. The forested provincial park and community pasture have the greatest potential for wildlife production. Wildlife habitat is confined largely to small bluff and pothole type of habitat in the areas of better soils to the north of the escarpment. This habitat is becoming less abundant each year.

Population figures for all species of wildlife are unavailable for the municipality since few recent aerial surveys have been conducted in the area. Specific comments on each species or group of species follow.

White-tailed Deer

Canada Land Inventory ungulate capability (Map 1) for this area indicates that approximately one township of land is rated Class 1w for winter range for deer and elk. Three townships, comprising the park and community pasture are rated Class 2 for moose, deer and elk. Approximately two-thirds of a township, in a narrow band along the escarpment, are rated as Class 4. The broad area around Whitewater Lake and the flat rolling area to the north and east of Boissevain is rated low for deer with the remainder of the municipality in Classes 5 and 6. In spite of the low capability ratings in some of the flatter area of the R.M., small bluffs and potholes and uncleared pasture are excellent habitats for deer, simply because little tree cover remains in the district. Summer range for deer occurs all over the district in spite of intensive agriculture but winter range is confined to those areas with forest cover, largely on the escarpment and in the Turtle Mountain. In some years, when emergent vegetation such as cattail and reeds is plentiful on the edge of Whitewater Lake, deer commonly overwinter around the lake. Deer populations on the plains are probably low considering the amount of habitat available. On the escarpment and in the mountain, however, populations should be good to excellent.

Moose

Moose are relative newcomers to this district, at least in any numbers. Although infrequently observed 10-15 years ago, it is only within the last 5-10 years that moose are becoming a permanent addition to the fauna of the Turtle Mountain and Community Pasture. One survey, in 1982, located moose from the east end of the Community pasture to within a couple of miles of PTH #21 near Goodlands. Most, if not all of these animals have emigrated into this region from North Dakota. A population estimate of 50 moose has been suggested for the entire Turtle Mountain area.

Elk

Although elk are periodically reported in the Turtle Mountain area of the district there has been no evidence to suggest that elk have become established and are reproducing. Historical records, however, indicate that elk were a common ungulate in this area of Manitoba.

Waterfowl and Wetlands

The most productive area rated for waterfowl is a small part of the district along its northern and eastern borders. This area is largely a bluff and pothole area with potholes much less than 40 acres in size. In the aggregate they have the potential for good waterfowl production. The Turtle Mountain Park and pasture are rated as Class 3S, important not only for production but also as a migration stopping area for ducks.

Most of the remainder of the district is rated poor for waterfowl production. The most notable waterfowl area in the district is Whitewater Lake, not for its capacity to produce ducks but for its importance as a migration stop or staging area. Within the last 10 years, goose numbers have increased dramatically so that peak numbers of snow and blue geese now reach 200,000

birds annually with 10-20,000 Canadas also using the lake during fall. Duck numbers in September and October vary but in the last few years have seldom exceeded 20,000 birds, most of which are mallards.

There are numerous lakes in the Turtle Mountain which exceed 40 acres in size. With the exception of Whitewater Lake, the Big Slough and Boissevain Reservoir just outside Boissevain, there are no other waterbodies exceeding 40 acres in the other portions of the district.

There are no confirmed records of geese nesting either in the Turtle Mountain or on the plains, thus most waterfowl production is ducks.

Furbearers

Furbearers are found throughout the Municipality but since most of the habitat is on the escarpment or in the Turtle Mountain, throughout the park and pasture aquatic furbearers such as beaver and muskrat are common as well as mink and weasel. Coyotes, red fox, squirrel, raccoons and badger are found all over the district, particularly in association with the Turtle Mountain and in the pockets of habitat on the plains.

Non-Game Species

Although the exact status of the species is unknown, the Western Painted Turtle is the most noteworthy non-game species that occurs in the district, principally within the Turtle Mountain and escarpment areas. The turtle is a common sight along roads and trails in the park and on the shorelines of the many lakes, sloughs and potholes in the park and pasture. Parks Branch has recently indicated in their Master Plan for the area that future studies will center on this reptile.

The red necked grebe has been studied in the provincial park and is considered to be an important nesting species on several lakes in the park. Protection from disturbance may be given to this species on several lakes in the park in due course under the Parks Branch Master Plan. No other non-game species or area utilized by non-game wildlife is of note within the district, with the possible exception of one active great blue heron rookery in the Turtle Mountain area. As encroachment on treed or pasture areas continues, as well as escalated drainage of sloughs and potholes, valuable habitat for a broad spectrum of wildlife is lost. The capacity of the rural municipality to produce and support wildlife will be a direct factor of how much habitat remains.

Order-in-Council Wildlife Lands

The R.M. of Morton has portions of the Whitewater Lake Public Shooting Grounds and the Whitewater Lake Wildlife Management Area (WMA). The WMA is described as the waters of Whitewater Lake which are variable, dependent on yearly rainfall and runoff and evaporation. At present the WMA, by definition, is smaller than it was in the mid and late 1970s.

The Public Shooting Grounds (PSG) are difficult to define since there is apparently some shoreline of the lake on the north, west and south sides which technically belong to the Crown and are legally PSG. On the east end of the

lake, the boundaries are not definite but include a fairly good sized block of Crown land. At present the Surveys Branch is completing an entire survey of the area which will hopefully define on a map where the private and Crown land is, and from this an accurate description of the PSG can be drawn, both on a map and delineated on the ground.

Wildlife Projects

The Manitoba Wildlife Federation has one-quarter section southwest of Boissevain along the escarpment which is totally forested and dedicated to wildlife. Ducks Unlimited has several projects in the district. D.U. is also doing a feasibility study on Whitewater Lake but at present it is not known what will be the outcome of their investigations.

II. CONCERNS/OBJECTIVES

Perhaps the biggest issue in this district is the possibility of depredation to cereal crops by waterfowl. In normal years, crops are generally harvested by the time large numbers of geese and ducks congregate on Whitewater Lake or on lakes in the Turtle Mountain, thus the problem is minimal. When harvest is delayed, however, depredation on crops can be a serious threat for some distance away from Whitewater Lake.

Flooding due to beaver activity is not serious but it does occur along highways and municipal roads or on private land. Regional staff, Highways Department or municipal staff deal with problems as they arise.

Deer damage to forage or grain is minimal and complaints have not been on the increase. Field staff have techniques available to prevent damage if the affected farmer does not wish to claim compensation for losses.

In the last three years, because of the high migrant goose population frequenting the district in September and October, there has been a significant influx of American waterfowl hunters to this area. As a result there has been a great deal of concern expressed by local hunters and municipal officials who object to:

1. having to compete with so many non-residents,
2. non-residents hunting extensively for upland birds which are currently in the low part of their population cycle, and
3. the damage caused to municipal roads and trails during inclement weather by hunters.

This problem is being addressed by the Wildlife Branch and may result in hunting seasons that are more restrictive to the non-resident.

The issue of disappearing wildlife habitat continues to be of prime concern in this district. Bulldozing of bluffs and pastures and drainage of potholes and sloughs continues to escalate here as in other parts of southern Manitoba. This continued decline in habitat will result in a decline in the wildlife species, from songbirds to deer. Recent efforts by the Turtle Mountain Wildlife

Association and the R.M. of Morton to arrest the breaking of unused road allowances will be one means of ensuring some habitat remains but the acreage involved will be minimal compared to the potential for loss on private land. The Turtle Mountain Provincial Park and PFRA Community Pasture will continue to be the major forested areas in the district and thus the major habitat blocks for wildlife.

Recreational Aspects of Wildlife

The most notable use of wildlife is by recreational hunters, principally for waterfowl and deer. In the park, wildlife viewing is encouraged and will likely be augmented in future by Parks Branch development, particularly for moose and beaver. Spring and fall staging of waterfowl attract a number of local and non-local people who view and photograph geese which congregate on farm fields or Whitewater Lake. The variety of waterfowl and shorebirds using Whitewater Lake could be a big drawing card to bird watchers, but as yet this area has not attracted many people for this pursuit.

The following objectives and policies are suggested for consideration by the Board of the District.

Objectives

1. To maintain wildlife populations at existing levels, particularly on poorer quality land.
2. To restrict any further clearing of forest within the PFRA Community Pasture.
3. To promote all forms of wildlife use within the Turtle Mountain Provincial Park; trapping, hunting for grouse, deer or waterfowl and potentially for moose.
4. To promote programs and legislation to maintain wildlife habitat on private land, unused road allowances and Crown land.
5. To promote communication and cooperation between people and agencies, the municipal council, government departments, Ducks Unlimited (Canada), etc., so as to achieve an active program of conservation of habitat and wildlife resources within the district.

III. POLICIES/GUIDELINES

In order to achieve the stated objectives, the following policies shall be applied in order to promote the maintenance and proper use of wildlife resources of the Planning District.

1. The Board of the District should protect from clearing of shrub or tree cover, all lands within agricultural capability Classes 4, 5 and 6.
2. Whitewater Lake should be protected from drainage, and from excessive or deleterious agricultural use on its periphery.

3. Rural subdivisions and industrial developments in the vicinity of Whitewater Lake (anywhere within the area flooded in 1976) should be discouraged by the Board.
4. Development of Whitewater Lake to achieve its potential for waterfowl production or to hold and maintain fall concentrations of geese and ducks should be encouraged by the Board through agencies willing to undertake a project of this nature.
5. Areas prone to waterfowl or deer depredation should be recognized and landowners encouraged to seek assistance or advice from the Department of Natural Resources in an attempt to minimize or reduce losses.

IV. IMPLEMENTATION

The objectives and policies of the District with respect to land use and wildlife resources should be implemented as follows:

1. By assistance and advice on conservation practices by staff of DNR, Dept. of Agriculture and the Turtle Mountain Conservation District.
2. By public and private cooperation through management and development agreements.
3. By the adoption of zoning by-laws.
4. Through control of subdivisions and the issuance of development permits where applicable.

CROWN LANDS

INTRODUCTION

This section describes the Crown lands in the Morton-Boissevain Planning District, providing an inventory of Crown lands and present commitments. Additionally, this section will discuss the authority for Crown lands, the legal aspects thereof and the planning and administration of Crown land.

DEFINITION

Crown land, for the purposes of this section, is defined as all land under Order-in-Council designated as: Provincial Park, Provincial Forest, Ecological Reserve, Wildlife Management Area, and Community Pasture, plus all other land administered by the Department of Natural Resources and Department of Agriculture under 'The Crown Lands Act'. In addition, all waterbodies, streams, rivers, and creeks are considered Crown lands except where original title has confirmed the lake bed or stream bed to an individual.

ACTS AFFECTING CROWN LANDS

There are a variety of acts which affect the administration and management of Crown lands. For the purposes here, the principal acts which govern use and management of these lands are:

1. The Crown Lands Act,
2. The Fisheries Act,
3. The Forest Act,
4. The Provincial Park Lands Act,
5. The Water Power Act,
6. The Rivers and Streams Act,
7. The Wildlife Act, and
8. The Water Resources Administration Act.

MANAGEMENT AND ADMINISTRATION OF CROWN LAND

The actual management and administration of Crown land is split between two Departments of Government, the Departments of Natural Resources and Agriculture. The Agricultural Crown Lands Branch has been assigned the functions and related administration pertaining to the issuance of agricultural leases and permits of occupation or use of those Crown lands which are designated by the Minister of Natural Resources as:

1. primarily agricultural lands, and
2. designated as multiple use lands which may only be used for agricultural purposes on an interim or secondary use basis, subject to specific conditions and covenants required by other resource users.

The principal responsibility for Crown land remains with the Department of Natural Resources, which administers The Crown Lands Act excepting those specific sections under the responsibility of the Minister of Agriculture.

The Minister of Natural Resources is responsible for administration, direction and control of the surveys of Crown lands. Survey monuments defining Township, Section and Quarter Section corners have been established throughout the Planning District.

The protection of the township survey fabric, the primary function of which is to support the transferring of rights in land via The Real Property Act or The Crown Lands Act, is essential to efficient and effective land administration. No system, purporting to give evidence of the ownership of land is complete if one cannot determine what land is being conveyed or where its boundaries are located. Boundaries, once defined, are a matter of law and the survey monument is the vital link between the ground and the administrative record.

CROWN LAND CLASSIFICATION AND PLANNING

Crown land is exempt from The Planning Act and is under the jurisdiction of the Manitoba Government as governed by the various acts of the Legislature mentioned above.

The classifying to use of Crown land in the southern portion of the Province is the responsibility of the Crown Land Classification Committee, (CLCC). This is an Interdepartmental Committee with representation from the Departments of Agriculture, Natural Resources and Municipal Affairs. The CLCC reports to and receives their direction from the Provincial Land Use Committee of Cabinet.

In carrying out this responsibility, the CLCC has established Bloc Planning Committees (BPCs). These BPCs have regional representatives from the Departments of Agriculture, Natural Resources and Municipal Affairs. The BPCs provide field land use recommendations. The Crown Land Classification Committee prepares Crown land plans from these recommendations and requires that all such plans be reviewed and commented on by Local Councils and/or Planning District Boards. It is only after such review and appropriate adjustment if necessary, that a final Crown land plan is prepared.

INVENTORY

In the Morton-Boissevain Planning District there are approximately 29,700 hectares of Crown land, (Map 2, Table 1), representing approximately 25.6 percent of the land base in the District.

PRESENT COMMITMENTS

In the Morton-Boissevain Planning District, the major commitments of Crown land are to Provincial Parks, Provincial Forest, Community Pasture, Public Shooting Grounds and Wildlife Management Area under Order-in-Council.

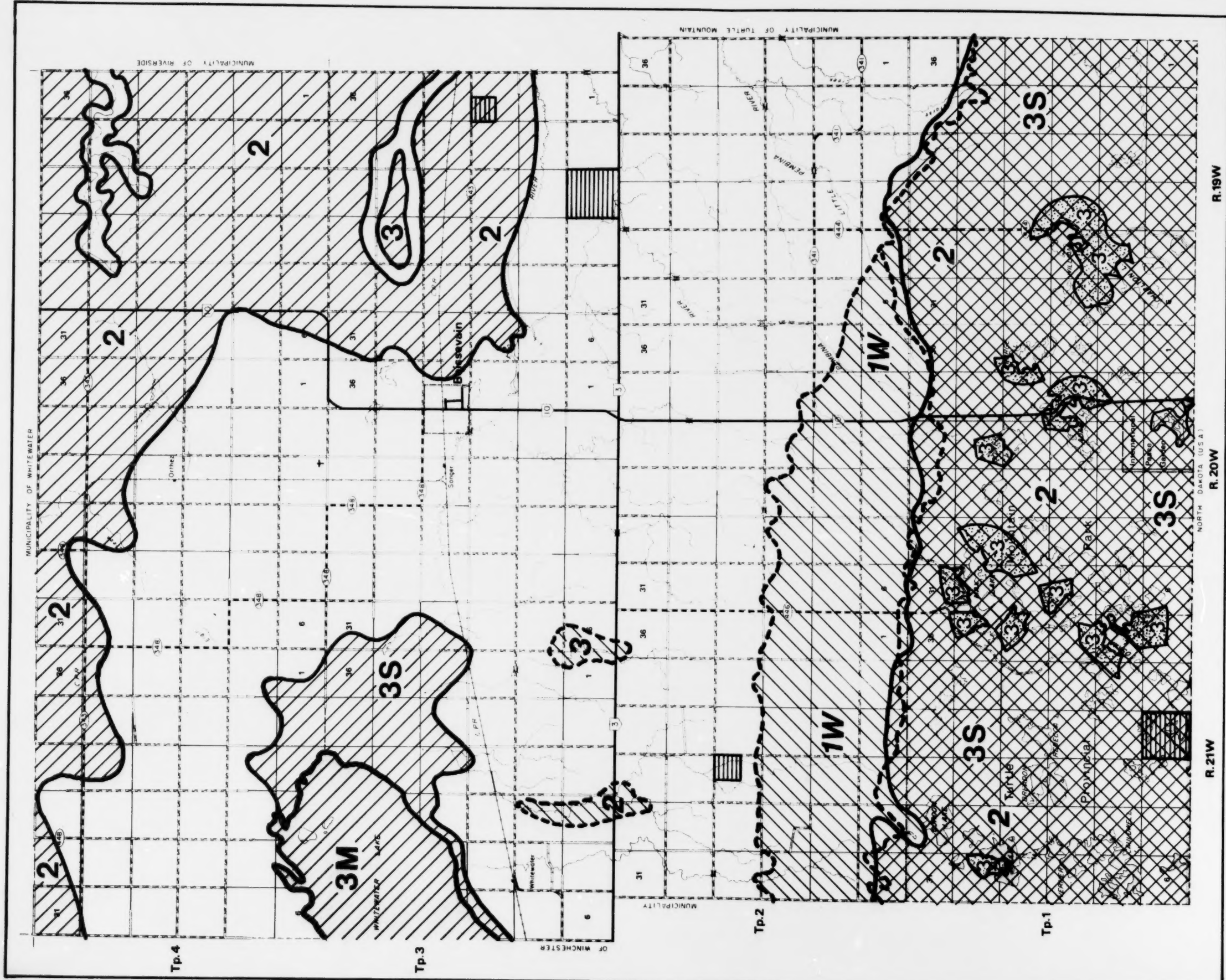
Turtle Mountain Provincial Park and Turtle Mountain Provincial Forest jointly occupy 15,418 hectares. An additional 430ha are in the Provincial Forest, and 119ha are in William Lake Provincial Recreation Park. The Fairburn Wayside occupies an area of about one hectare. The Community Pasture covers 9,594ha. The lands surrounding Whitewater Lake have been designated Public Shooting Grounds (4,140ha), while the waters of the lake itself are a Wildlife Management Area.

Only three quarter sections are presently committed to agricultural use, and all are located in the Public Shooting Ground.

Table 1 . Crown Land Commitments in the Morton-Boissevain Planning District
(June, 1984)

Commitment	Number	Area: hectares (acres)
<u>1. Order-in-Council</u>		
Provincial Park/Forest		15,418 (38,100)
Provincial Forest		430 (1,062)
Provincial Park		119 (293)
Community Pasture		9,594 (23,707)
Public Shooting Grounds		4,140 (10,230)
Wildlife Management Area		(waters of Whitewater Lake)
<u>2. Agricultural</u>		
Forage Lease*	3	183 (468)
Total		29,701 (73,392)

* All agricultural commitments are located within the Public Shooting Grounds.



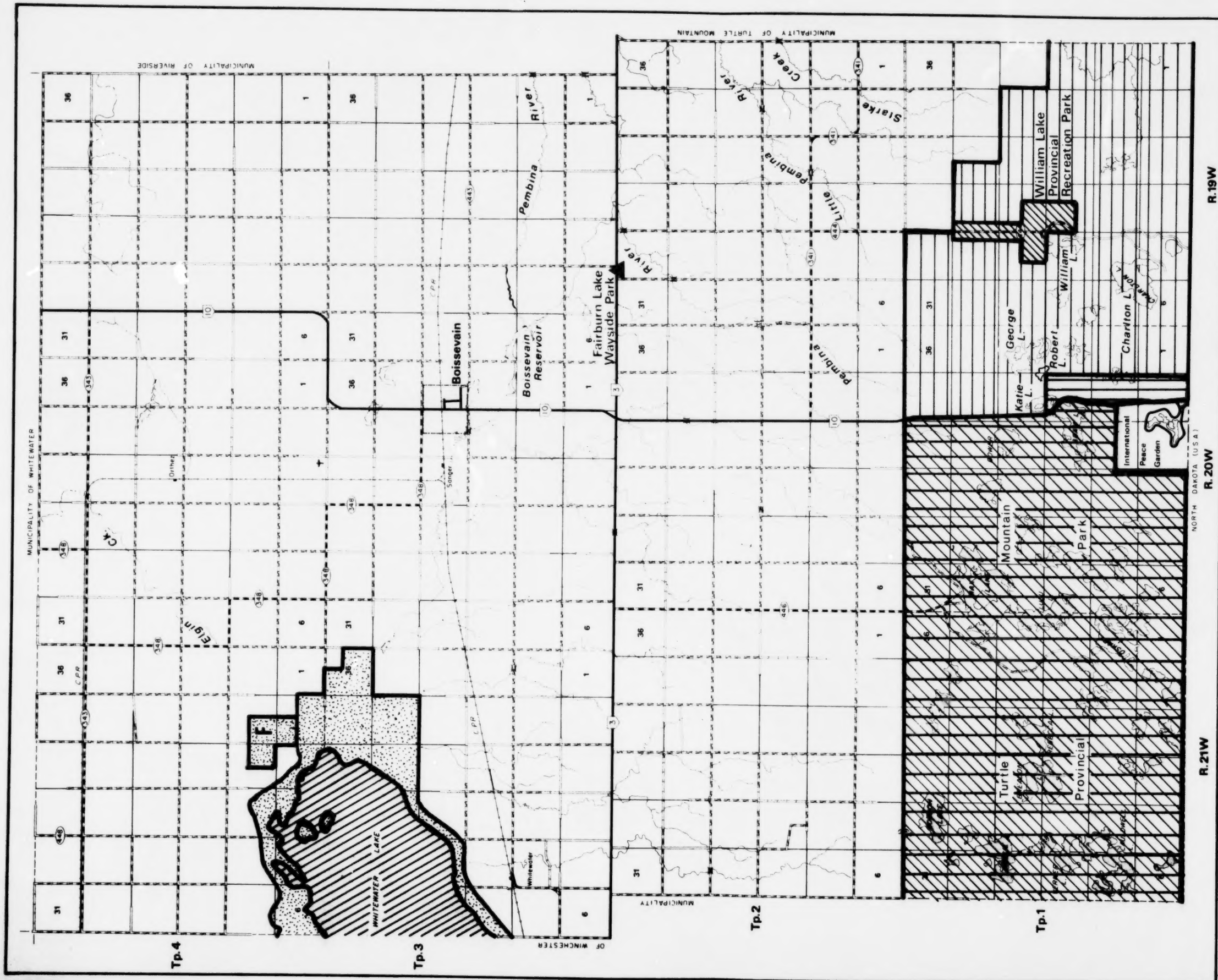
MORTON - BOISSEVAIN PLANNING DISTRICT

MAP 1.
OUTDOOR RECREATION, WATERFOWL AND UNGULATE C.L.I.
CAPABILITY AND DUCKS UNLIMITED PROJECT AREAS.

- C.L.I. CAPABILITY**
- OUTDOOR RECREATION (CLASS 3)*
 - WATERFOWL (CLASS 2, 3, 3S, 3M)*
 - UNGULATES (CLASS 1W, 2, 3)*
 - DUCKS UNLIMITED PROJECT AREA

*Note Remaining lands in district are in Class 4, 5 & 6

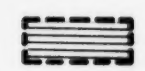
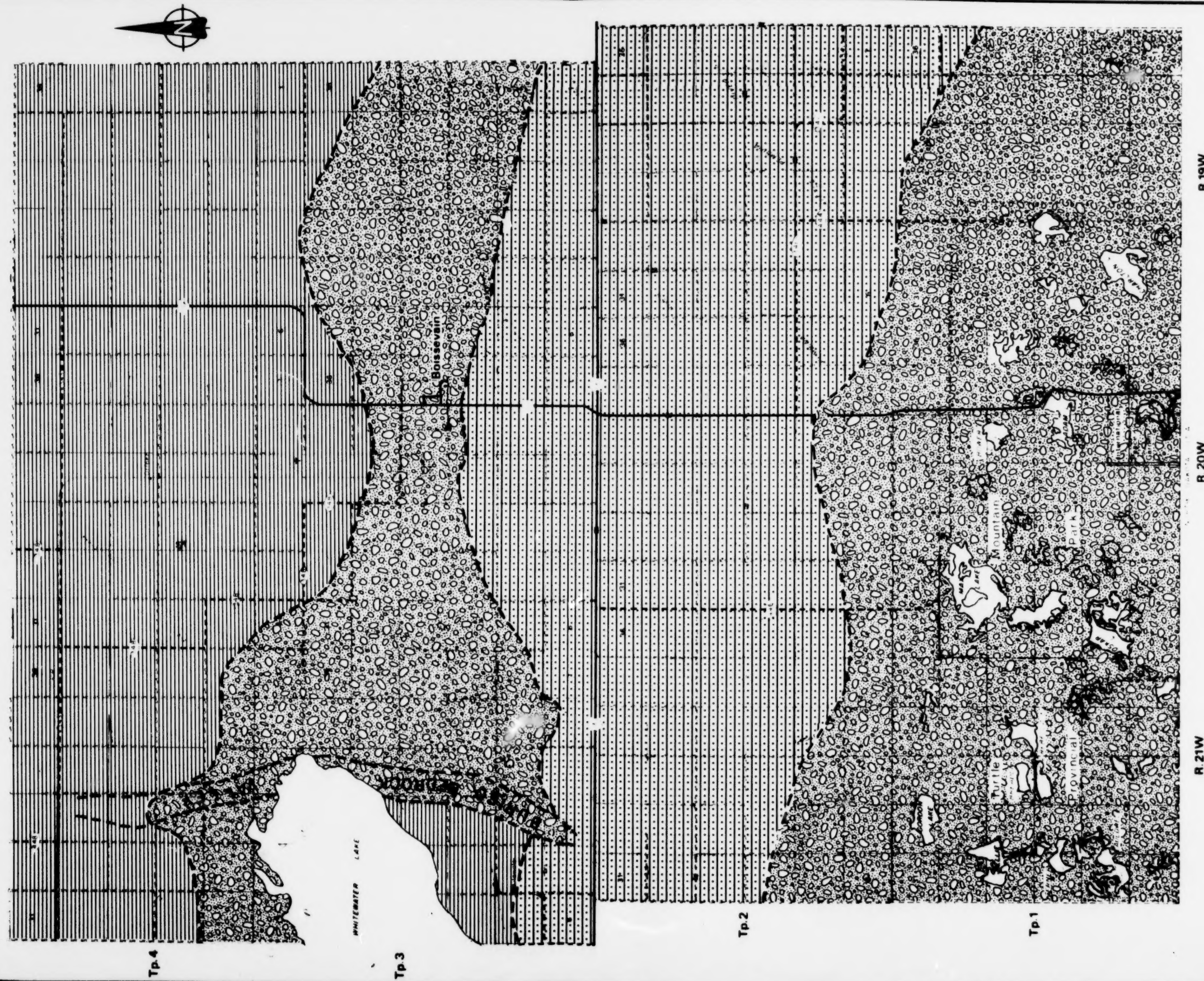




MAP 2.
MORTON - BOISSEVAIN PLANNING DISTRICT
PROVINCIAL PARKS, FOREST, W.M.A., PUBLIC SHOOTING
GROUND AND CROWN LAND COMMITMENTS.

- PROVINCIAL PARK
- PROVINCIAL FOREST
- W.M.A.
- PUBLIC SHOOTING GROUND
- COMMUNITY PASTURE
- AGRICULTURE FORAGE LEASE





SHALE: FRACTURED ZONE
MORE THAN 30 m (100 ft)
IN MOST OF THE AREA
IN GENERAL QUALITY OF
OCCUR ABOVE THE SH.



SAND AND GRAVEL: M.
IN TILL AND OTHER S.
A FEW METRES TO MO.
THE 0.1 L/s TO 1.0
AT SOME LOCATIONS.
AND FAIR TO GOOD IN

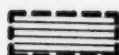


SANDSTONE AND SAND:
DEPTH TO THE AQUIFER
(15 TO MORE THAN 330
RANGE (1-25 I.G.P.M.
A FEW LOCATIONS. W
IS A COMMON PROBLEM

DRAWN	S.S.
CHECKED	
PREPARED	
M. RUTULIS	

PROVINCE	
DEPARTMENT OF	
WATER RESOURCES	
SUBMITTED	

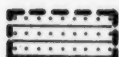
LEGEND



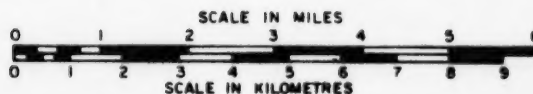
SHALE: FRACTURED ZONES IN SHALE BEDROCK. DEPTH TO THE AQUIFERS USUALLY MORE THAN 30 m (100 ft). WELL YIELD COMMONLY LESS THAN 0.5 L/s (5 I.G.P.M) IN MOST OF THE AREA. WATER IN THE SHALE IS SALTY OR OF POOR QUALITY. IN GENERAL QUALITY DECREASES WITH DEPTH. A FEW SAND AND GRAVEL AQUIFERS OCCUR ABOVE THE SHALE BEDROCK.



SAND AND GRAVEL: MAINLY ISOLATED LENSES OF SAND AND GRAVEL INTERBEDDED IN TILL AND OTHER SURFICIAL DEPOSITS. DEPTH TO THE AQUIFERS RANGERS FROM A FEW METRES TO MORE THAN 100 m (5 - 330 ft). WELL YIELD GENERALLY IS IN THE 0.1 L/s TO 1.0 L/s RANGE (1-13 I.G.P.M) BUT MAY BE UP TO 10 L/s (130 I.G.P.M) AT SOME LOCATIONS. WATER QUALITY FAIR TO VERY POOR IN THE LOWLAND AREA AND FAIR TO GOOD IN THE UPLAND (SOUTHERN) AREA.



SANDSTONE AND SAND: EXTENSIVE SANDSTONE AND SAND LAYERS IN BEDROCK FORMATIONS. DEPTH TO THE AQUIFER RANGES FROM LESS THAN 5m TO MORE THAN 100 m (15 TO MORE THAN 330 ft) WELL YIELD IN GENERAL IN THE 0.1 L/s TO 2 L/s RANGE (1-25 I.G.P.M); MAXIMUM YIELD MAY EXCEED 5 L/s (65 I.G.P.M). AT A FEW LOCATIONS. WATER QUALITY GENERELLY FAIR TO GOOD, HIGH IRON CONCENTRATION IS A COMMON PROBLEM. SAND AND GRAVEL AQUIFERS MAY OCCUR ABOVE THE BEDROCK.



DRAWN S.S.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH		MORTON-BOISSEVAIN PLANNING DISTRICT AQUIFERS	
CHECKED	SUBMITTED 		APPROVED 	
PREPARED M. RUTULIS			SCALE AS SHOWN	DATE 84 07 05
			SHEET 2 OF 3	FILE NO. 90-1-7-1117





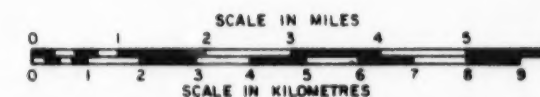
LEGEND



GROUNDWATER POLLUTION HAZARD AREA

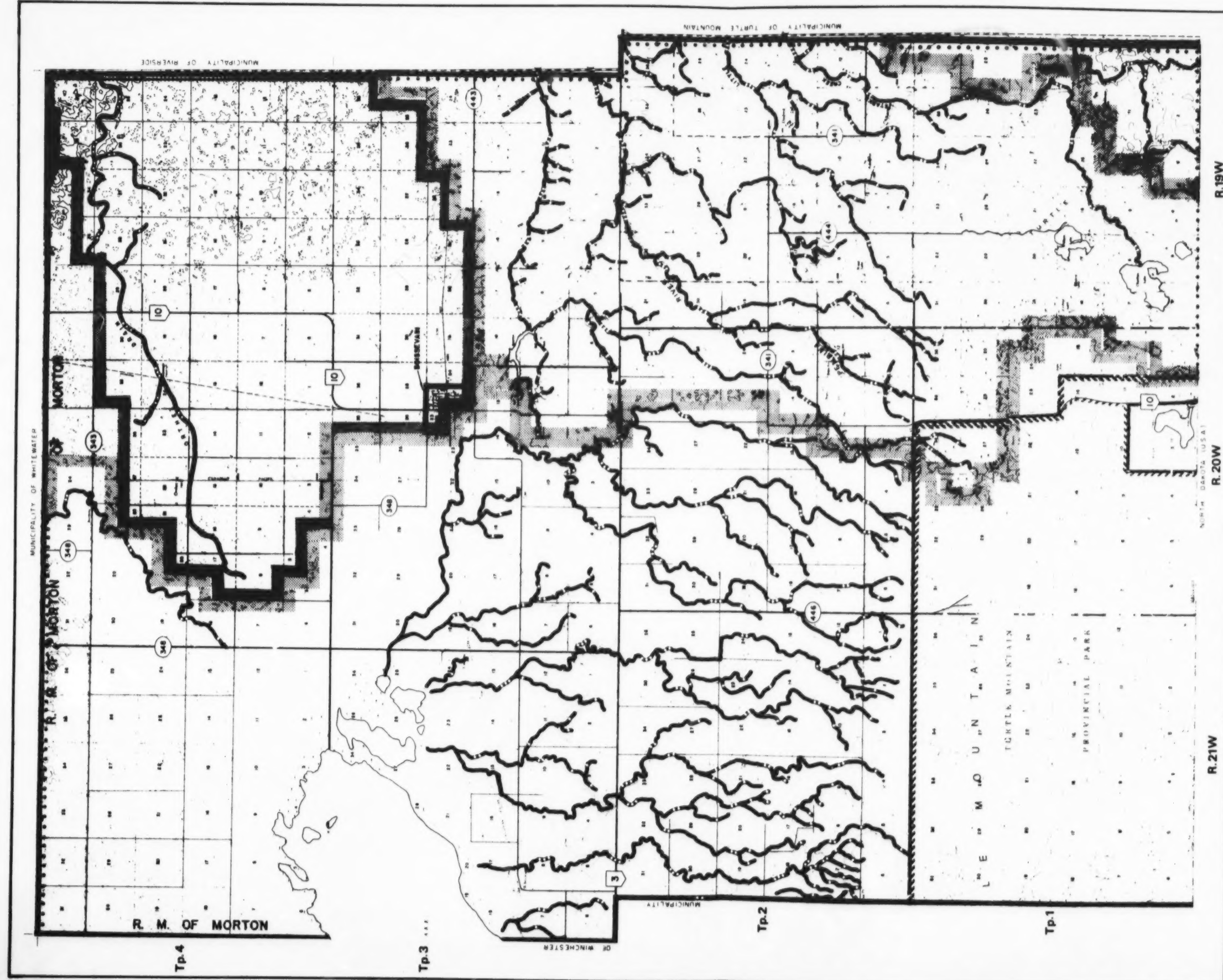
NOTE : DETAILED FIELD INVESTIGATIONS MAY SHOW THAT GROUNDWATER POLLUTION HAZARD DOES NOT EXIST IN SOME OF THE INDICATED AREAS OR IN SOME PARTS OF THEM

REFERENCES: M. RUTULIS, 1983 GROUNDWATER POLLUTION HAZARD MAP
VIRIDEN AREA, MANITOBA



DRAWN S.S.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH		MORTON-BOISSEVAIN PLANNING DISTRICT	
CHECKED			GROUNDWATER POLLUTION HAZARD AREAS	
PREPARED M. RUTULIS	SUBMITTED <i>J. Henry</i>	APPROVED <i>R. Bow</i>	SCALE AS SHOWN	DATE 84 06 27
			SHEET 3 OF 3	FILE NO. 90-1-7-1117

MAP 4



MORTON-BOISSEVAIN PLANNING DISTRICT

MAP 5 SURFACE DRAINAGE SYSTEM

LEGEND

WATER COURSE
1st ORDER DRAINS
2nd ORDER DRAINS
3rd ORDER DRAINS
4th ORDER DRAINS
5th ORDER DRAINS
6th ORDER DRAINS
7th ORDER DRAINS

CONSERVATION DISTRICT BOUNDARY

LIMITS OF DRAINAGE AREA

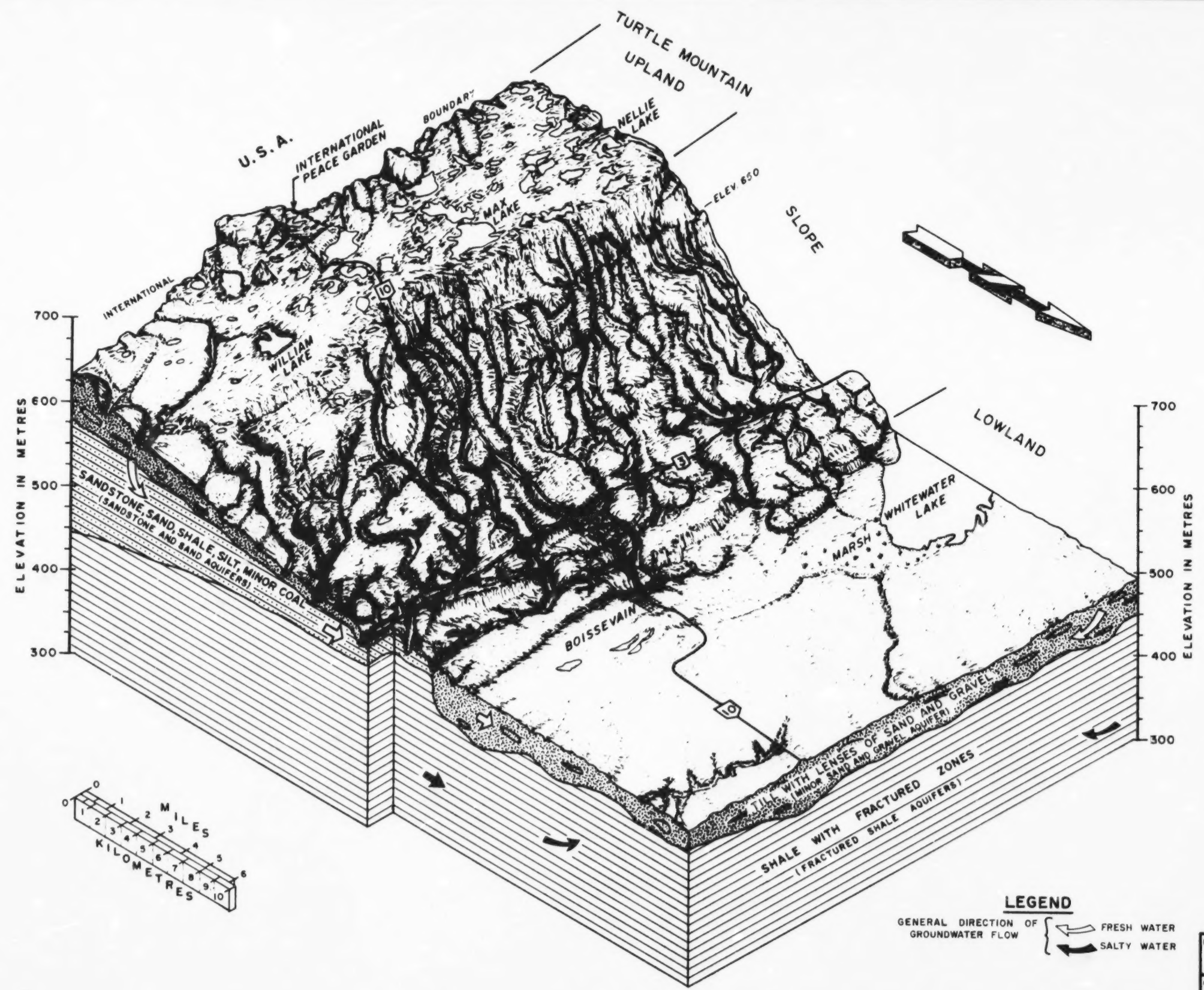
CITY, TOWN AND MUNICIPAL BOUNDARIES

PROVINCIAL TRUNK HIGHWAYS

PROVINCIAL ROADS

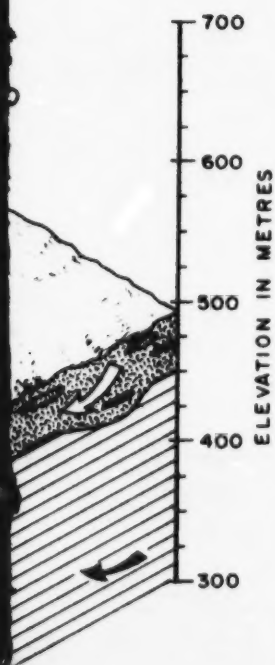
FOREST OR PARK BOUNDARIES





LEGEND
GENERAL DIRECTION OF GROUNDWATER FLOW
FRESH WATER
SALTY WATER

DRAWN: F. R.	DEPARTMENT OF WATER RESOURCES SUNSHINE
CHECKED:	
PREPARED: M. RUTULIS	



END

FRESH WATER
SALTY WATER

DRAWN: F. R.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH		MORTON - BOISSEvain PLANNING DISTRICT	
CHECKED:			HYDROGEOLOGICAL SETTING	
PREPARED: M. RUTULIS	SUBMITTED <i>J. L. L...</i>	APPROVED <i>R. B...</i>	SCALE AS SHOWN	DATE 84 06 29
			SHEET 1 OF 3	FILE NO 90-1-7-1117

FIGURE 1